

***TECHNICAL MANUAL***  
***Of***  
***INTEL 945GC***  
***Based***  
***Mini-ITX M/B For ATOM Processor***

***NO.G03-NC91-F***

***Rev2.0***

**Release date: Nov. , 2008**

**Trademark:**

\* Specifications and Information contained in this documentation are furnished for information use only, and are subject to change at any time without notice, and should not be construed as a commitment by manufacturer.

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## Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. To minimize pollution and ensure environment protection of mother earth, please recycle.



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# TABLE OF CONTENT

USER'S NOTICE .....	iii
MANUAL REVISION INFORMATION .....	iii
ITEM CHECKLIST .....	iii
<b>CHAPTER 1 INTRODUCTION OF INTEL CHIPSET MOTHERBOARD</b>	
<b>1-1 FEATURE OF MOTHERBOARD .....</b>	<b>1</b>
<b>1-1-1 SPECICAL FEATURE OF MOTHERBOARD .....</b>	<b>2</b>
<b>1-2 SPECIFICATION .....</b>	<b>3</b>
<b>1-3 LAYOUT DIAGRAM &amp; JUMPER SETTING .....</b>	<b>3</b>
<b>CHAPTER 2 HARDWARE INSTALLATION</b>	
<b>2-1 JUMPER SETTING .....</b>	<b>6</b>
<b>2-2 CONNECTORS AND HEADERS .....</b>	<b>7</b>
<b>2-2-1 CONNECTORS .....</b>	<b>7</b>
<b>2-2-2 HEADERS .....</b>	<b>8</b>
<b>CHAPTER 3</b>	
<b>3-1 ENTERING SETUP .....</b>	<b>12</b>
<b>3-2 GETTING HELP .....</b>	<b>13</b>
<b>3-3 THE MAIN MENU .....</b>	<b>13</b>
<b>3-4 ADVANCED BIOS FEATURES .....</b>	<b>16</b>
<b>3-5 INTERGRATED PERIPHERALS .....</b>	<b>19</b>
<b>3-6 PC HEALTH STATUS .....</b>	<b>20</b>
<b>3-7 POWER MANAGEMENT SETTING .....</b>	<b>22</b>
<b>3-8 MISCELLANEOUS CONFIGURATION .....</b>	<b>24</b>

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## Manual Revision Information

Reversion	Revision History	Date
2.0	Second Edition	November, 2008

## Item Checklist

- ☒ Motherboard
- ☒ Cable(s)
- ☒ CD for motherboard utilities
- ☒ Motherboard User's Manual
- ☒ Back panel

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# Chapter 1

## Introduction of the Motherboard

### 1-1 Feature of motherboard

- \* Intel 945GC chipset and ICH7 chipset.
- \* Onboard Intel ATOM CPU, with low power consumption never denies high performance.
- \* Support FSB 533MHz.
- \* Support DDRII 400/533MHz up to 2GB.
- \* Onboard RTL 8102E **Megabit** Ethernet LAN (only for NC91-230-LF).
- \* Onboard RTL 8111C Gigabit Ethernet LAN (only for NC91-330-LF).
- \* Integrated Realtek ALC662 6-Channel Audio CODEC.
- \* Support USB2.0 data transport demands .

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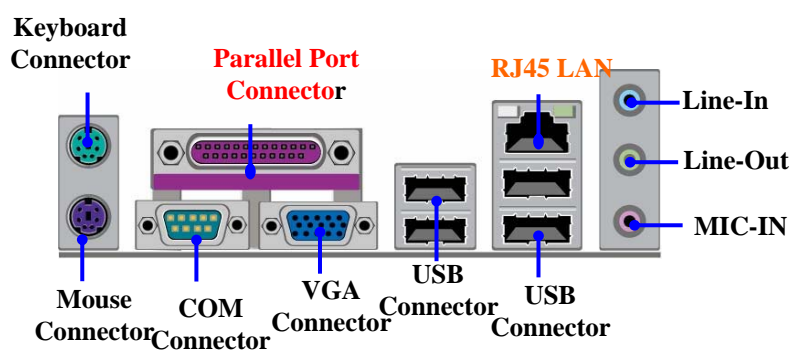
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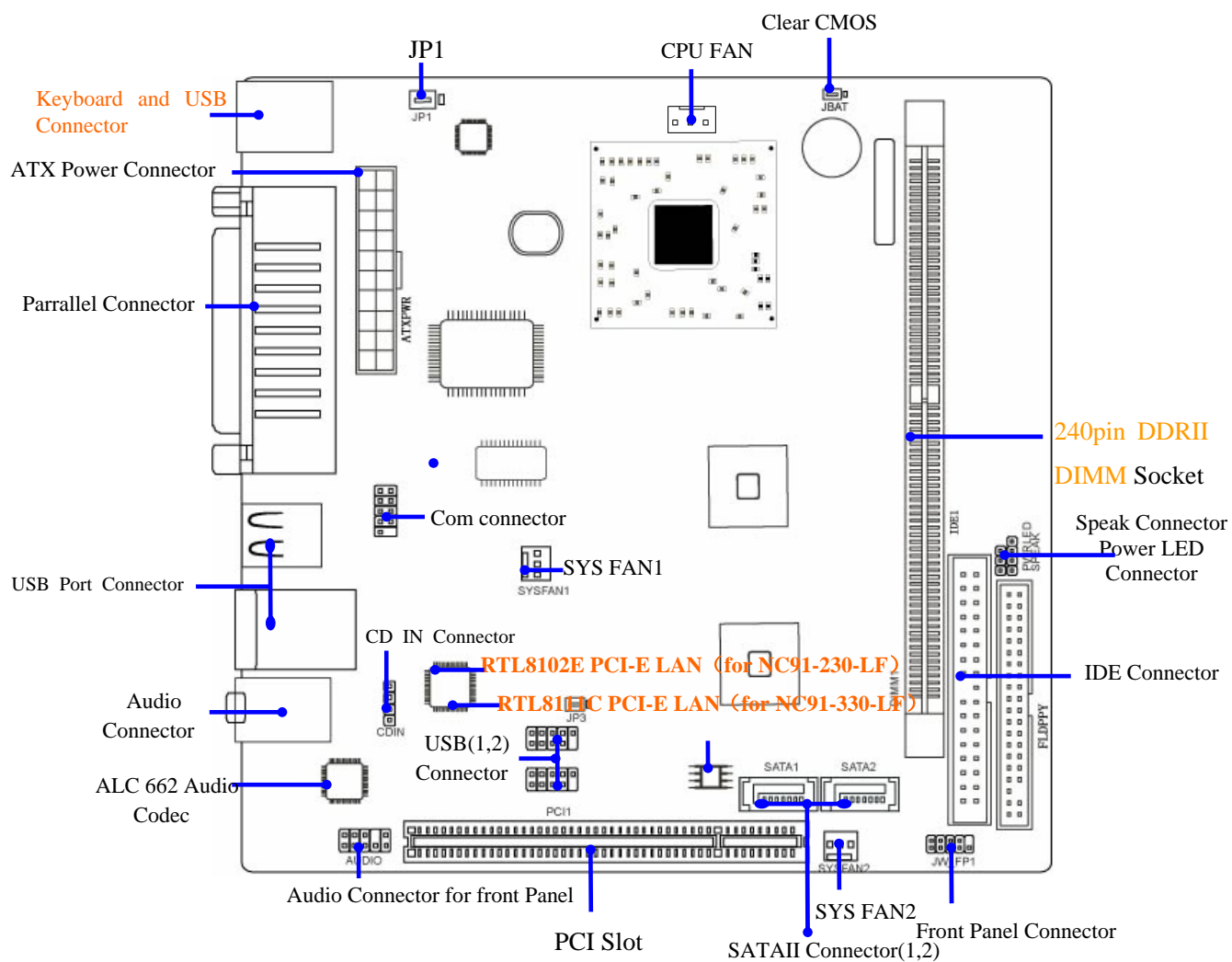
## 1-2 Specification

<b>Spec</b>	<b>Description</b>
<b>Design</b>	* Mini ITX form factor 4 layers PCB size: 17.0x17.0cm
<b>Chipset</b>	* Intel 945GC Northbridge chipset * Intel 82801G Southbridge chipset
<b>Embedded CPU</b>	* Support FSB533 * Low Power Consumption * ATOM CPU
<b>Memory Socket</b>	* 240-pin DDRII DIMM socket x1 * Support DDRII 400MHz /DDRII 533MHz system Modules DDR memory * Expandable to 2GB.
<b>Expansion Slots</b>	* 32-bit PCI slot x 1pcs
<b>Integrate IDE</b>	* One PCI IDE controller that supports PCI Bus Mastering, ATA PIO/DMA and the ULTRA DMA 133/100/66 functions that deliver the data transfer rate up to 100 MB/s;
<b>LAN</b>	* Integrated Realtek RTL8111C PCI-E LAN (only for NC91-330-LF). * Support Fast Ethernet LAN function of providing 10Mb/100Mb/1000Mb (only for NC91-330-LF)Ethernet data transfer rate * Integrated Realtek RTL8102E PCI-E LAN (only for NC91-230-LF). * Support Fast Ethernet LAN function of providing 10Mb/100Mb (only for NC91-230-LF)Ethernet data transfer rate

<b>Audio</b>	<ul style="list-style-type: none"><li>* Realtek ALC662 6 channel Audio Codec integrated</li><li>* Audio driver and utility included</li></ul>
<b>BIOS</b>	<ul style="list-style-type: none"><li>* Award 8MB SPI Flash ROM</li></ul>

## 1-3 Layout Diagram & Jumper Setting







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## ***Jumper***

<b>Jumper</b>	<b>Name</b>	<b>Description</b>	<b>Page</b>
JBAT	CMOS RAM Clear Function Setting	3-pin Block	p.6
JP1	KB/USB Power On Function Setting	3-pin Block	P.6
JP3	USB1/2 Power On Function Setting	3-pin Block	P.7

## ***Connectors***

<b>Connector</b>	<b>Name</b>	<b>Description</b>	<b>Page</b>
USB1,USB2	USB Port Connector	4-pin Connector	p.7
UL3	RJ45 LAN Connector		p.7
VGA CN	VGA Port Connector	D-sub15-pin Female	p.7
CN4	Line-Out /MIC/Line-In Audio Connector	3 Phone Jack	p.7
PS2 KB/MS	PS2 Keyboard & Mouse Connector		p.7
SATA1,2	Serial ATA Connectors		p.7

## ***Headers***

<b>Header</b>	<b>Name</b>	<b>Description</b>	<b>Page</b>
USB1,USB2	USB2.0 Port Headers	9-pin Block	p.8
IDE	40-Pin IDE Connector	40-pin IDE Block	p.8
CPUFAN, SFAN1/2	FAN Speed Headers	3-pin Block	P.11
JW_FP1 (PWR LED/ IDE LED/ /Power Button /Reset)	Front Panel Headers (PWR LED/ IDE LED/ /Power Button /Reset)	9-pin Block	P.9

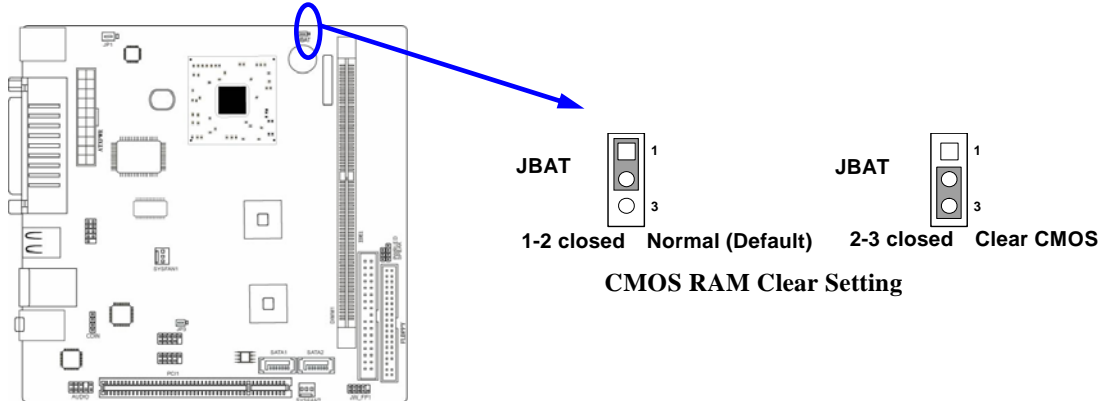
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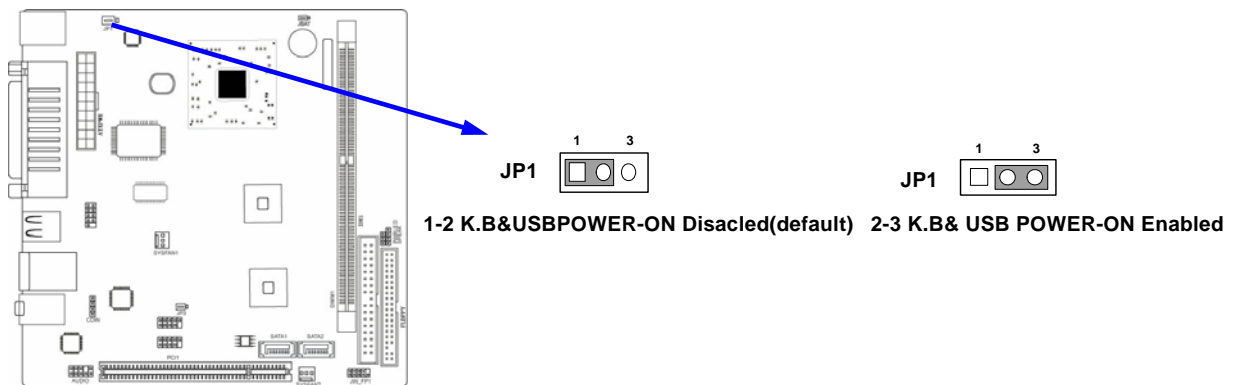
## Chapter 2

### 2-1 Jumper Setting

#### (1) Clear CMOS (3-pin): JBAT

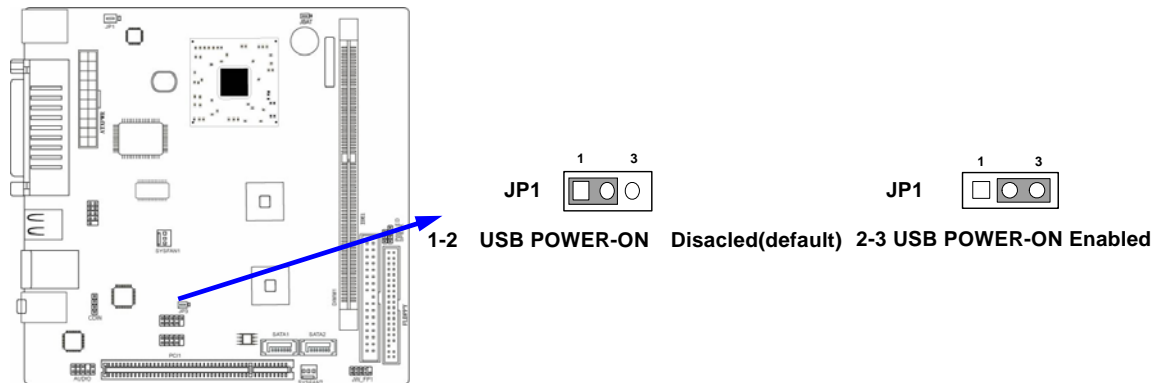


#### (2) JP1 KB/USB Power On Function Setting



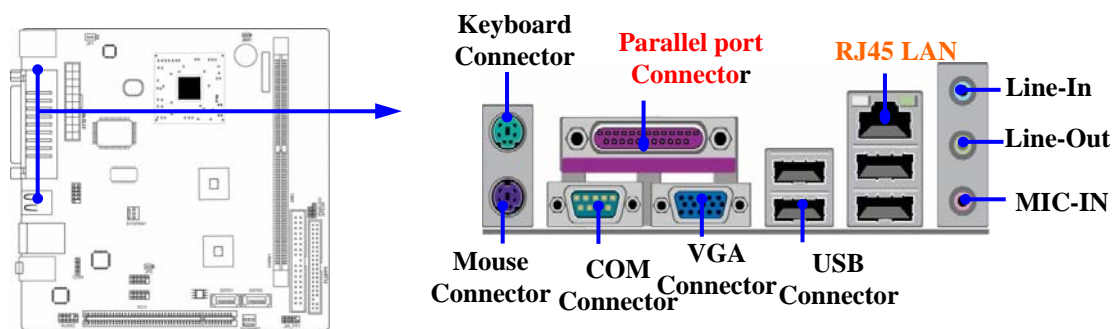
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### (3) JP3 USB1/2 Power On Function Setting



## 2-2 Connectors and Headers

### 2-2-1 Connectors

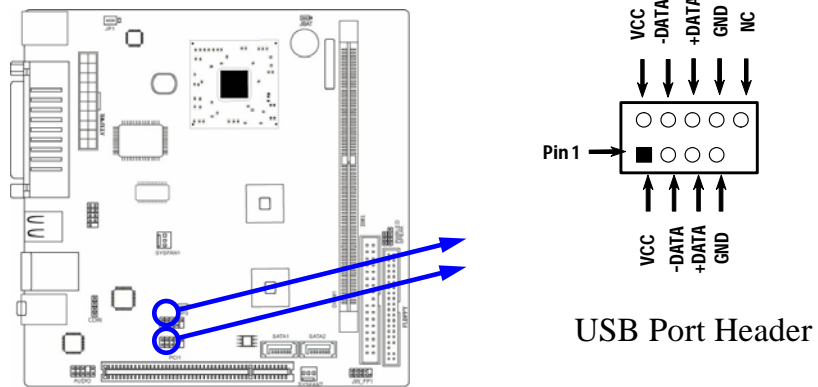


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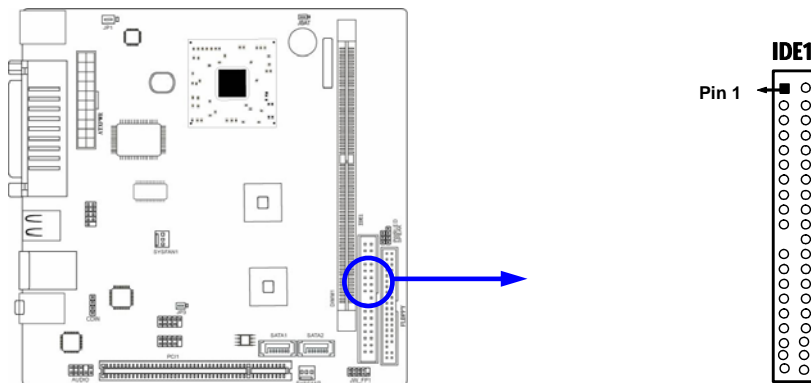
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## 2-5-2 Headers

### (1) USB Port Headers (9-pin):



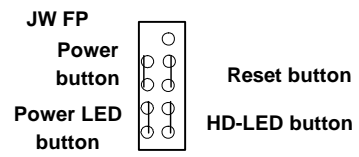
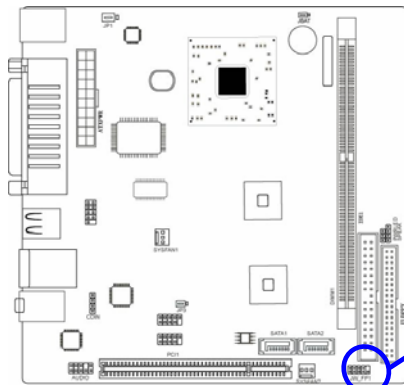
### (2) IDE Connector:



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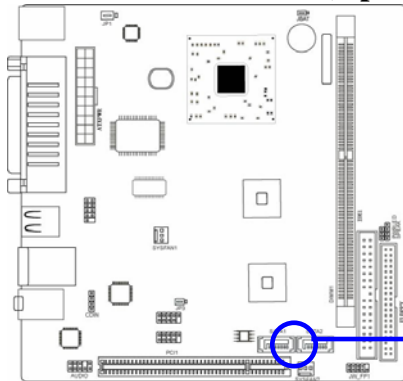
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### (3) Power switch: FRONT PANEL



System Case Connections

### (4) Serial ATA Connector (7-pin female): SATAII1/SATAII2

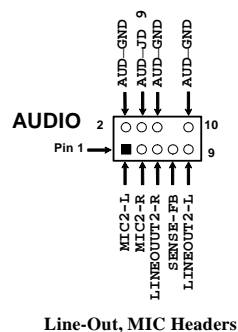
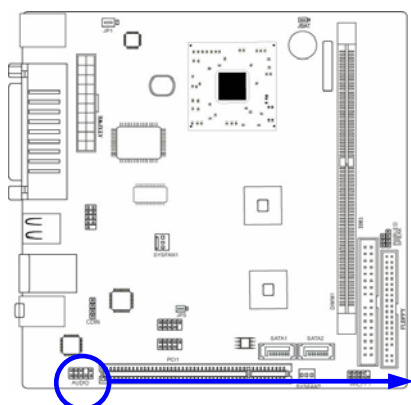


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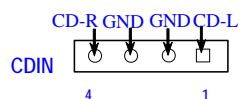
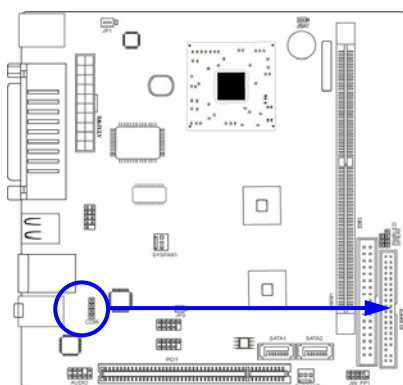
**(5) Line-Out, MIC-In Header (9-pin): AUDIO for front Panel**

This header connects to Front Panel Line-out, MIC-In connector with cable.



**(6) CD Audio-In Headers (4-pin): CDIN**

CDIN are the connectors for CD-Audio Input signal. Please connect it to CD-ROM CD-Audio output connector.

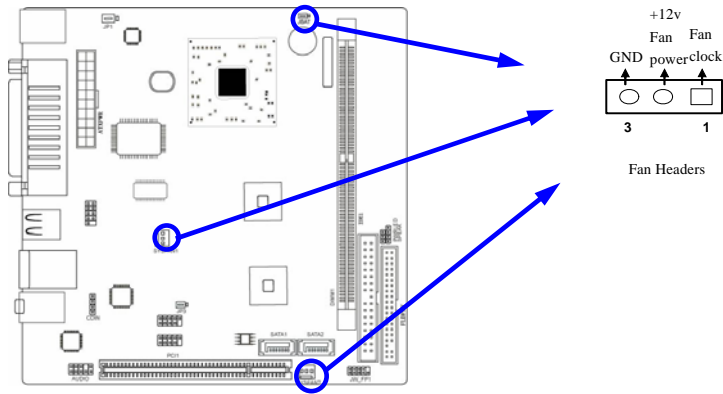


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**(7) FAN Speed Headers (3-pin): CPUFAN, SFAN1/SFAN2**

These connectors support cooling fans of 350mA (4.2 Watts) or less, depending on the fan manufacturer, the wire and plug may be different. The red wire should be positive, while the black should be ground. Connect the fan's plug to the board taking into consideration the polarity of connector.



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## Chapter 3

### Introducing BIOS

The BIOS is a program located on a Flash Memory on the motherboard. This program is a bridge between motherboard and operating system. When you start the computer, the BIOS program will gain control. The BIOS first operates an auto-diagnostic test called POST (power on self test) for all the necessary hardware, it detects the entire hardware device and configures the parameters of the hardware synchronization. Only when these tasks are completed done it gives up control of the computer to operating system (OS). Since the BIOS is the only channel for hardware and software to communicate, it is the key factor for system stability, and in ensuring that your system performance as its best.

In the BIOS Setup main menu of Figure 3-1, you can see several options. We will explain these options step by step in the following pages of this chapter, but let us first see a short description of the function keys you may use here:

- Press <Esc> to quit the BIOS Setup.
- Press ↑↓←→ (up, down, left, right) to choose, in the main menu, the option you want to confirm or to modify.
- Press <F10> when you have completed the setup of BIOS parameters to save these parameters and to exit the BIOS Setup menu.
- Press Page Up/Page Down or +/- keys when you want to modify the BIOS parameters for the active option.

### 3-1 Entering Setup

Power on the computer and by pressing <Del> immediately allows you to enter Setup.



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If the message disappears before your respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the “RESET” button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt> and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to

**Press <F1> to continue, <Ctrl-Alt-Esc> or <Del> to enter Setup**

## **3-2 Getting Help**

### **Main Menu**

The on-line description of the highlighted setup function is displayed at the bottom of the screen.

### **Status Page Setup Menu/Option Page Setup Menu**

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press <Esc>.

## **3-3 The Main Menu**

Once you enter Award® BIOS CMOS Setup Utility, the Main Menu (Figure 3-1) will appear on the screen. The Main Menu allows you to select from fourteen setup functions and two exit choices. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

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Phoenix - AwardBIOS CMOS Setup Utility

Standard CMOS Features	Miscellaneous Control
Advanced BIOS Features	Load Optimized Defaults
Advanced Chipset Features	Load standard Defaults
Integrated Peripherals	Set Supervisor password
Power Management Setup	Set user password
PnP/PCI Configurations	Save & Exit Setup
PC Health Status	Exit Without Saving
Esc : Quit    F9 : Menu in BIOS    ↑↓→← : Select Item F10 : Save & Exit Setup	

Figure 3-1

**Standard CMOS Features**

Use this Menu for basic system configurations.

**Advanced BIOS Features**

Use this menu to set the Advanced Features available on your system.

**Advanced Chipset Features**

Use this menu to change the values in the chipset registers and optimize your system's performance.

**Integrated Peripherals**

Use this menu to specify your settings for integrated peripherals.

**Power Management Setup**

Use this menu to specify your settings for power management.

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## **Miscellaneous Control**

Use this menu to specify your settings for **Miscellaneous Control**.

### **PC Health Status**

This entry shows your PC health status.

### **Power User Overclock Settings**

Use this menu to specify your settings (frequency, Voltage) for overclocking demand

### **CPU Thermal Throttling Setting**

The selection is set for activating the active CPU Thermal Protection by flexible CPU loading adjustment in the arrange of temperature you define.

### **Load Optimized Defaults**

Use this menu to load the BIOS default values these are setting for optimal performances system operations for performance use.

### **Password Settings**

This entry for setting Supervisor password and User password

### **Save & Exit Setup**

Save CMOS value changes to CMOS and exit setup.

### **Exit Without Saving**

Abandon all CMOS value changes and exit setup.

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## 3-4 Advanced BIOS Features

### Phoenix - AwardBIOS CMOS Setup Utility

#### Advanced BIOS Features

Virus Warning	Disabled	Item Help
CPU L3 Cache	Enabled	
CPU Feature	Press Enter	Menu Level >
Hard Disk Boot Priority	Press Enter	
Hyper-Threading Technology	Enabled	
Quick power on self Test	Enabled	
First Boot Device	Removable	
Second Boot Device	Hard Disk	
Third Boot Device	CDROM	
Boot other Device	Enabled	
Boot other Device	Enabled	
Boot Up NumLock Status	On	
Typematic Rate Setting	Disabled	
Typematic Rate (Chars/Sec)	6	
Typematic Delay (Msec)	250	
Security Option	Setup	
APIC Mode	Enabled	
MPS Version Control For OS	1.4	
OS Select For DRAM > 64MB	Non-OS2	
HDD S.M.A.R.T. Capability	Disabled	
Report No FDD For windows	Yes	
Limit CPULD Maxval	Disabled	
C1E Function	Enabled	
Execute Disabled Bit	Enabled	
↑↓←→ Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5:Previous Values F6:Optimized Defaults F7:Standard Defaults		

### Hard Disk Boot Priority

The selection is for you to choose the hard disk drives priorities to boot from.

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### **Virus Warning**

The selection Allow you to choose the VIRUS Warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempt to write data into this area, BIOS will show a warning message on screen and alarm beep.

**Disabled** (default) No warning message to appear when anything attempts to access the boot sector or hard disk partition table.

**Enabled** Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector of hard disk partition table.

### **CPU Internal Cache**

The default value is Enabled.

**Enabled** (default) Enable cache

**Disabled** Disable cache

**Note:** *The internal cache is built in the processor.*

### **External Cache**

Choose Enabled or Disabled. This option enables the Level 2 cache memory.

### **Quick Power On Self-Test**

This category speeds up Power On Self Test (POST) after you power on the computer. If this is set to Enabled, BIOS will shorten or skip some check items during POST.

**Enabled** (default) Enable quick POST

**Disabled** Normal POST

### **First/Second/Third Boot Device**

The BIOS attempts to load the operating system from the devices in the sequence selected in these items. The settings are Floppy, LS/ZIP, HDD-0/HDD-1/HDD-3, SCSI, CDROM, LAD and Disabled.

### **Boot Up Floppy Seek**

During POST, BIOS will determine if the floppy disk drive installed is 40 or 80 tracks. 360K type is 40 tracks while 760K, 1.2M and 1.44M are all 80 tracks.

### **Boot Up NumLock Status**

The default value is On.

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**On** (default) Keypad is numeric keys.

**Off** Keypad is arrow keys.

#### **Gate A20 Option**

**Normal** The A20 signal is controlled by keyboard controller or chipset hardware.

**Fast** (default) The A20 signal is controlled by port 92 or chipset specific method.

#### **Typematic Rate Setting**

Keystrokes repeat at a rate determined by the keyboard controller. When enabled, the typematic rate and typematic delay can be selected. The settings are: Enabled/Disabled.

#### **Typematic Rate (Chars/Sec)**

Sets the number of times a second to repeat a keystroke when you hold the key down. The settings are: 6, 8, 10, 12, 15, 20, 24, and 30.

#### **Typematic Delay (Msec)**

Sets the delay time after the key is held down before beginning to repeat the keystroke. The settings are 250, 500, 750, and 1000.

#### **Security Option**

This category allows you to limit access to the system and Setup, or just to Setup.

**System** The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.

**Setup** (default) The system will boot, but access to Setup will be denied if the correct password is not entered prompt.

#### **HDD S.M.A.R.T Capability**

This option allow you to enable the HDD S.M.A.R.T Capability (Self-Monitoring, Analysis and Reporting Technology) . You can choose from Enabled and Disabled.

#### **MPS Version Control For OS 1.4**

This option is only valid for multiprocessor motherboards as it specifies the version of the Multiprocessor Specification (MPS) that the motherboard will use.

#### **OS Select For DRAM > 64MB**

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Allows OS2® to be used with >64MB or DRAM. Settings are Non-OS/2 (default) and OS2. Set to OS/2 if using more than 64MB and running OS/2®.

### 3-5 Intergrated peripherals

#### Phoenix - AwardBIOS CMOS Setup Utility

##### Intergrated peripheral

Onboard IDE Function	Press Enter	Item Help
Onboard Device Function	Press Enter	
Onboard Superio Funtion	Press Enter	Menu Level >>
PWR Status after PWE Failure	Press Enter	
Init Display First	PCI Slot	
↑↓→← Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5:Previous Values F6:Optimized Defaults F7:Standard Defaults		

#### Phoenix - AwardBIOS CMOS Setup Utility

##### OnBoard Device Function

Onboard PCIE Lan Controller	Auto	Item Help
Onboard PCIE LAN Bootrom	Disabled	
High Definition Audio	Enabled	Menu Level >>
USB Host Controller	Enabled	
USB 2.0 Function	Enabled	
USB keyboard Legacy Support	Disabled	
USB Mouse Legacy Support	Enabled	
↑↓→← Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5:Previous Values F6:Optimized Defaults F7:Standard Defaults		

#### Onboard HD Audio

This item allows you to decide to enable/disable the chipset family to support HD Audio. The settings are: Enabled, Disabled.

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## Onboard PCIE LAN Bootrom

Decide whether to invoke the boot ROM of the onboard LAN chip.

## 3-6 PC Health Status

This section shows the Status of you CPU, Fan, and Warning for overall system status. This is only available if there is Hardware Monitor onboard.

### Phoenix - AwardBIOS CMOS Setup Utility

#### PC Health Status

Shutdown Temperature	Enabled	Item Help
CPU Thermal-Throttling	Press Enter	
CPU Thermal-Throttling Temp	70°C	Menu Level >
CPU Thermal-Throttling Duty	50.00%	
CPU Thermal-Throttling Beep	Enabled	
Show PCHealth in Post	Enabled	
Smart fan configurations	Press Enter	
VCC 3V	3.42V	
Vcore	1.10V	
+1.5V	1.51V	
+5V	4.96V	
+12V	12.14V	
5VSB	5.08V	
VDIM	1.84V	
VBAT	3.17V	
CPU Temperature	67°C/152F	
SYS Temperature	44°C/113F	
CPUFAN Speed	0 RPM	
↑↓←→ Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5:Previous Values F6:Optimized Defaults F7:Standard Defaults		

### Show PC Health in Post

During Enabled, it displays information list below. The choice is either Enabled or Disabled

#### CPU Smart FAN Configurations

#### CPU Full-Speed Temp



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This item allows you setting the FAN works in full speed when the temperature over the value which out set. If the temperature below the value but over the Idle Temperature, the FAN will works over 60% of full speed, and the higher temperature will gain higher FAN speed, after over the temperature which this item setting, the FAN works in full speed.

CPU Idle Temp

This item allows you setting the FAN works in 60% of full speed, when the temperature lower than the temperature which you setting.

**Current CPU Temperature/Current System Temp/Current FAN1, FAN2 Speed/Vcore/Vdd/3.3V/+5V/+12V/-12V/VBAT(V)/5VSB(V)**

This will show the CPU/FAN/System voltage chart and FAN Speed.

**SFAN Smart Mode:**

There are three choose , Disabled, Formula 1, Formula 2.

Disabled: Fan setting full speed.

Formula 1: Fan working low speed, under temperature 2.

Formula 2: Fan stop when under temperature 2.

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## 3-7 Power Management Setup

The Power Management Setup allows you to configure your system to most effectively save energy saving while operating in a manner consistent with your own style of computer use.

### Phoenix - AwardBIOS CMOS Setup Utility

#### Power Management Setup

ACPI function	Enabled	Item Help
Power Management	User Define	
Video off Method	V/H SyNC + BLANK	Menu Level >
Video off in Suspend	Yes	
Suspend Type	Stop Grant	
Modem USE IRQ	3	
Suspend Mode	Disabled	
HDD Power Down	Disabled	
Soft-OFF by PWRBTN	Instant off	
Wake-up by PCI Card	Disabled	
Power on by ring	Disabled	
Wake-up by USB KB from S4	Disabled	
PS2 KB/MS Wake-up from s4-s5	Disabled	
Resume by alarm	Disabled	
Date of month alarm	0	
Time(hh:mm:ss) alarm	0:0:0	
PM Timer Reload Events	Press Enter	
PCI Express PM Function	Press Enter	
↑↓←→ Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help F5:Previous Values F6:Optimized Defaults F7:Standard Defaults		

#### ACPI Function

This item allows you to Enabled/Disabled the Advanced Configuration and Power Management (ACPI). The settings are Enabled and Disabled.

#### HDD Power Down (Disabled)

The IDE hard drive will spin down if it is not accessed within a specified length of time.Options are from 1 Min to 15 Min and Disable.

#### Video Off Method

This determines the manner in which the monitor is blanked.

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**DPMS (default)** Initial display power management signaling.

**Blank Screen** This option only writes blanks to the video buffer.

**V/H SYNC+Blank** This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.

**.MODEM Use IRQ**

If you want an incoming call on a modem to automatically resume the system from a power-saving mode, use this item to specify the interrupt request line (IRQ) that is used by the modem. You might have to connect the fax/modem to the motherboard Wake On Modem connector for this feature to work.

**Soft-Off by PWRBTN**

Under ACPI (Advanced Configuration and Power management Interface) you can create a software power down. In a software power down, the system can be resumed by Wake up Alarms. This item lets you install a software power down that is controlled by the power Button on your system. If the item is set to Instant-Off, then the power button causes a software power down. If the item is set to Delay 4 Sec, then you have to hold the power button down for four seconds to cause a software power down.

**RTC Alarm Resume**

When set to Enabled, additional fields become available and you can set the date (day of the month), hour, minute and second to turn on your system. When set to 0 (zero) for the day of the month, the alarm will power on your system every day at the specified time .

**Date (of month)**

You can choose which month the system will boot up. Set to 0, to boot every day.

**Time (hh:mm:ss)**

You can choose what hour, minute and second the system will boot up.

**Note:** If you have change the setting, you must let the system boot up until it goes to the operating system, before this function will work.

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## 3-8 Miscellaneous Configuration

Phoenix - AwardBIOS CMOS Setup Utility

### Miscellaneous Control

Auto Detect PCI Clock	Disabled	Item Help
Spread Spectrum	Disabled	
Current Host/PCI Clock is 133/33MHz		Menu Level >
Host/PCI Clock at Next Boot	133/33MHz	
Current DRAM Clock is 533MHz		
DRAM Clock at next Boot	BY SPD(DDR 533)	
CPU Vcore 7-shift	Normal	
VCC 1.05 Select	1.067v(default)	
NB VCCP Select	1.1213v(default)	
SB VCC Select	1.5080v(default)	
VCC 2.5V Select	2.5021v(default)	
VDIMM Select	1.863v(default)	
↑↓↔← Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help		
F5:Previous Values F6:Optimized Defaults F7:Standard Defaults		

### Reset Configuration Data

If you enable this item and restart the system, any Plug and Play configuration data stored in the BIOS Setup is cleared from memory.